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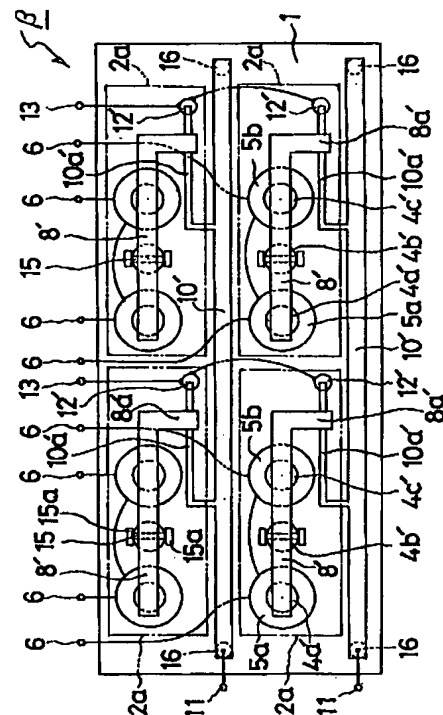
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(54) 【発明の名称】 自己保持型マトリクススイッチ

(57) 【要約】

【目的】 構造及び作製工程の簡素化及び作製コストの低廉化を実現する自己保持型マトリクススイッチを提供する。

【構成】 実装基板1と、当該実装基板1上に平面格子状に縦横配列されて仰向け横臥したE字型コア4'と、前記E字型コア4'の中立部材4b'先端に積立固着された永久磁石7と、前記E字型コア4'の左右両立部材4a'、4c'を囲捲し二つの円筒コイル5a、5bと、前記永久磁石7の頂端に支点を挺動自在に支持されかつ前記E字型コア4'の左右両立部材4a'、4c'に両端をそれぞれ当接自在なシーソーアーマチュア8'と、前記実装基板1上に固着された柱状固定接点12'と、前記シーソーアーマチュア8'の片端の延長端8a'により押下されて前記柱状固定接点12'と接触自在な可動接点10a'とを備えることを特徴とする。



【特許請求の範囲】

【請求項 1】実装基板と、

当該実装基板上に向きを同方向に揃えて平面格子状に縦横配列されて仰向け横臥された E 字型コアと、
前記 E 字型コアの中立部材先端に積立固着された永久磁石と、
前記 E 字型コアの左右両立部材の一方又は両方を立体的又は平面的に囲捲したコイルと、
前記永久磁石の頂端に支点を撻動自在に支持されかつ前記 E 字型コアの左右両立部材に両端をそれぞれ当接自在なシーソーアーマチュアと、
前記実装基板上に立設された柱状固定接点と、
前記シーソーアーマチュア片端の延長端により押下されて前記柱状固定接点と接触自在な可動接点とを備えることを特徴とする自己保持型マトリクススイッチ。

【請求項 2】コイルは、同一架設プリント基板上に貫突した全 E 字型コアの各左右両立部材の一方又は両方を平面渦巻状に囲捲したプリントパターンを複数個同時に描着形成されたことを特徴とする請求項 1 記載の自己保持型マトリクススイッチ。

【請求項 3】永久磁石の頂端は、シーソーアーマチュア支点を支持する支軸を内部に保持するとともに並行連立する挟持バネにより弾性拡張自在に形成した上向開口部を有する断面袋溝型軸受を冠着することを特徴とする請求項 1 又は 2 記載の自己保持型マトリクススイッチ。

【請求項 4】可動接点は、可撓性を有し、縦方向或いは横方向何れか一列に互り、実装基板上方に互り隣接所定間隔をおいて延架された導電ライン板途中から分岐突設し、先端を各対応する柱状固定接点の直上に接触自在に臨ませてなることを特徴とする請求項 1、2 又は 3 記載の自己保持型マトリクススイッチ。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、MDF 等の交換設備において、複数の加入者側回線及び交換機側回線を相互に任意に組み合わせ選択的に接続するのに供せられる自己保持型マトリクススイッチに関する。

【0002】

【従来の技術】MDF 等の交換設備においては、任意の入力ケーブルと任意の出力ケーブルとを一对一に対応させて電氣的に回線接続する為に、平面格子状に配列した当該入力ケーブル及び出力ケーブルの交点にそれぞれの接点が接続された多数の電磁リレーを集合してなるマトリクススイッチが使用されている。

【0003】当該マトリクススイッチにおいては、マトリクススイッチ自体を集合構成する電磁リレー群の励磁電流を常時通電する事なく消費電流を低減することを目的として、当該電磁リレー群に接点の自己保持機能を持たせた自己保持型マトリクススイッチを採用している。

【0004】この理由としては、電話回線のような開閉

頻度が比較的小さい回線を接点に収容した電磁リレーでは、接点の断接動作時のみ瞬間的にコイルに電流を通電して接点状態を遷移させ、定常状態では励磁電流を通電する必要が無く、多数の電磁リレーを集合して構成されるマトリクススイッチ自体の消費電力を著しく低減する事が出来るからである。

【0005】このような従来の自己保持型マトリクススイッチを図面を用いて説明する。図 9 は従来例の自己保持型マトリクススイッチの概略説明平面図、図 10 は同・拡大一部縦断面図である。

【0006】図中、 α は従来例の自己保持型マトリクススイッチ、1 は実装基板、2 は電磁リレー、3 はケース、4 は E 字型コア、5 はコイル、6 はコイル端子、7 は永久磁石、8 a、8 b はアーマチュア、9 a、9 b は板状支持バネ、10 は可動接点、11 は可動接点端子、12 は固定接点、13 は固定接点端子である。

【0007】自己保持型マトリクススイッチ α は、実装基板 1 上に単体電磁リレー 2 を複数個平面方向に格子状配列し実装構成されている。当該それぞれの単体電磁リレー 2 はケース 3 内に構成されており、当該ケース 3 内部に背面及び上側部材 4 a 並びに下側部材 4 c の連続三面を密接内嵌した正立 E 字型コア 4 の中央部材 4 b にはコイル 5 が捲着されており、当該コイル 5 からは励磁電流が供給されるコイル端子 6 が前記ケース 3 外部へ引き出されている。

【0008】さらに前記 E 字型コア 4 先端には、永久磁石 7 を間に挟んで並行移動自在に前記 E 字型コア 4 先端と閉磁路を形成してなるアーマチュア 8 a、8 b と、当該アーマチュア 8 a、8 b を前記ケース 3 に撻動自在に支持してなる板状支持バネ 9 a、9 b と、当該板状支持バネ 9 a を介してアーマチュア 8 a に取り付けられた可動接点 10 と、当該可動接点 10 に接続され前記ケース 3 外部に引き出されてなる可動接点端子 11 と、前記可動接点 10 と接触自在に前記ケース 3 内部に取り付けられた固定接点 12 と、当該固定接点 12 に接続され前記ケース 3 外部に引き出されてなる固定接点端子 13 とより構成される。

【0009】従来の自己保持型マトリクススイッチ α はこのような構成を有しており、当該自己保持型マトリクススイッチ α を集合構成する各電磁リレー 2 毎に、接点状態の遷移時のみに外部から極性を制御された励磁電流を瞬間的に通電して自己保持動作させ、入力ケーブル及び出力ケーブルが収容された接点の断接動作を独立して制御することにより、任意の入力ケーブル及び出力ケーブル同士を任意の組合せでマトリクス状に相互に回線接続する。

【0010】

【発明が解決しようとする課題】しかしながら前記従来の自己保持型マトリクススイッチ α はその製造にあたり、立体的な機械構造を有する各電磁リレー 2 の構成部

品点数が比較的多くなり、なおかつ（入力回線数）×（出力回線数）の個数の電磁リレー 2 が必要となる事も相俟って製造コストが非常に高くなるので、構造の簡素化が要求されていた。

【0011】又、自己保持型マトリクススイッチαの製造に当たり、多数の電磁リレー 2 の製造工程並びに次いで当該多数の電磁リレー 2 を実装基板 1 上に格子状に実装する実装工程の二工程が不可欠であり、製造工程が増加し製造コストの上昇は避けられなかった。

【0012】これに対する別の構成方法として、実装基板 1 上に電磁リレー 2 群の構成部品を直接組み付けて構成する方法も考えられるが、この場合にも電磁リレー 2 群が実装基板 1 上に三次元的に立体構成されることになりはならず、組立装置の構成の複雑化は避け得ず、同様にイニシャルコストの上昇は止むを得ないものとなっていた。ここにおいて、本発明は、当該従来欠点に鑑み、構造及び作製工程の簡素化及び作製コストの低廉化を実現する自己保持型マトリクススイッチを提供せんとするものである。

【0013】

【課題を解決するための手段】前記課題の解決は、本発明が次に列挙する新規な特徴的構成手段を採用することにより達成される。本発明の第 1 の特徴は、実装基板と、当該実装基板上に向きを同方向に揃えて平面格子状に縦横配列されて仰向け横臥した E 字型コアと、前記 E 字型コアの中立部材先端に積立固着された永久磁石と、前記 E 字型コアの左右両立部材の一方又は両方を立体的又は平面的に囲捲したコイルと、前記永久磁石の頂端に支点を梃動自在に支持されかつ前記 E 字型コアの左右両立部材に両端をそれぞれ当接自在なシーソーアーマチュアと、前記実装基板上に立設された柱状固定接点と、前記シーソーアーマチュア片端の延長端により押下されて前記柱状固定接点と接触自在な可動接点とを備えてなる自己保持型マトリクススイッチである。

【0014】本発明の第 2 の特徴は、前記第 1 の特徴におけるコイルが、同一架設プリント基板上に貫立した全 E 字型コアの各左右両立部材の一方又は両方を平面渦巻状に囲捲したプリントパターンを複数個同時に描着形成されてなる自己保持型マトリクススイッチである。

【0015】本発明の第 3 の特徴は、前記第 1 又は第 2 の特徴における永久磁石の頂端が、シーソーアーマチュア支点を支持する支点軸を内部に保持するとともに並行連立する挟持パネにより弾性拡張自在に形成した上向開口部を有する断面袋溝型軸受を冠着してなる自己保持型マトリクススイッチである。

【0016】本発明の第 4 の特徴は前記第 1、第 2 又は第 3 の特徴における可動接点が、可撓性を有し、縦方向或いは横方向何れか一列に互り、実装基板上方に互り隣接所定間隔をおいて延架された導電ライン途中から分岐突設し、先端を各対応する柱状固定接点の直上に接触

自在に臨ませてなる自己保持型マトリクススイッチである。

【0017】

【作用】本発明は、前記のような手段を講じたので、自己保持型マトリクススイッチの構成部品点数を削減し、なおかつ実装基板面からの組み付け作業が容易化され自動製作が可能となった。

【0018】

【実施例】

（実施例 1）本発明の第 1 実施例を図面につき詳説する。図 1 は本発明の第 1 実施例を示す自己保持型マトリクススイッチの平面図、図 2 は他の実施例を示す正面図、図 3 (a) (b) (c) (d) は同・接点の断接動作原理の各段階説明図、図 4 は袋溝型軸受の拡大一部断面図である。

【0019】図中、β は本実施例の自己保持型マトリクススイッチ、2 a は電磁リレー、4 a' は左立部材、4 b' は中立部材、4 c' は右立部材、8' はシーソーアーマチュア、8 a' は直角延長端、1 0' は導電ライン板、1 0 a' は L 形可動接点、1 2' は柱状固定接点、1 4 は軸受、1 4 a、1 4 b は並行連立挟持パネ、1 5 は両端ストップフランジ 1 5 a 付支軸、1 6 は支柱である。尚、前記従来例と同一部材には同一記号を付した。

【0020】図 1 において本実施例のマトリクススイッチ β は、（入力回線数 2 回線）×（出力回線数 2 回線）に対応する、最も構成の単純な（縦方向 2 個）×（横方向 2 個）の合計 4 個の電磁リレー 2 a を使用した場合を示している。本実施例のマトリクススイッチ β は、実装基板 1 上に複数の電磁リレー 2 a が平面格子状縦横配列して実装されてなる。

【0021】当該電磁リレー 2 a は、前記実装基板 1 上に向きを同一横向きに揃えて仰向け横臥固定した E 字型コア 4' の左立部材 4 a' に円筒コイル 5 a が、右立部材 4 c' に円筒コイル 5 b がそれぞれ捲着されており、円筒コイル 5 a と円筒コイル 5 b は互いに逆極性に直列接続され両極はコイル電極 6 に接続されている。

【0022】中立部材 4 b' の低上端には磁極方向に指向された永久磁石 7 及び軸受 1 4 が順次積立固着されており、当該軸受 1 4 内に回転自在に支承された支軸 1 5 にはシーソーアーマチュア 8' の支点が下受固着され梃動自在に構成されている。

【0023】当該シーソーアーマチュア 8' の右端は直角に折り曲げられた延長端 8 a' が形成され、対峙する支柱 1 6 により両端を支承され実装基板 1 上方の横方向に互り隣接所定間隔をおいて並行延架された導電ライン板 1 0' の途中から分岐突出した L 形可動接点 1 0 a' を前記延長端 8 a' により押下し、L 形可動接点 1 0 a' の先端を柱状固定接点 1 2' 頂端と接触自在に構成されている。

【0024】又、本実施例の構成部材は、実装基板1面の真上一方向からの装着作業のみで組立可能に構成されている。以下に当該組立手順の一例を挙げて説明する。先ず最初に実装基板1面上の所定位置にE字型コア4'・柱状固定接点12'・二本の支柱16をそれぞれ配列固着する。

【0025】次にE字型コア4'の左立部材4a'及び右立部材4c'に予め図示しないコイルボビンに巻着された円筒コイル5a、5bをそれぞれ挿嵌すると共に中立部材4b'上端に永久磁石7を磁極方向に積立固着し、さらに当該永久磁石7の頂端に軸受14を冠着する。

【0026】次いで、二本の支柱16の上端間に互って導電ライン板10'を渡架固着し、事前に接着等の手段を用いてシーソーアーマチュア8'支点下側に直交固着された支軸軸15を軸受14内に支承する、以上の手順を踏んで組み立てられる。

【0027】ここでシーソーアーマチュア8'は支軸軸15を介して軸受14に枢支されているが、永久磁石7の吸着力が作用し常時吸着保持されるので、シーソーアーマチュア8'は軸受14に載置しておくだけでも構わない。さらに支持を確実なものとする為には、一例として図4に示す様な袋溝型形状に軸受14を形成し、並行連立する挟持バネ14a、14bで弾性拡張自在な上向開口部14cを形成し、支軸軸15を内部に回転自在に挟持すれば良い。ここで挙げた固着方法には、ネジ止めや接着等任意の方法を選択可能である。

【0028】本実施例はこのような具体的実施態様を呈し、次にその動作につき説明する。先ず最初に接点の断路状態においては、図3(a)に示すように、予めシーソーアーマチュア8'は支軸軸15を中心とする反時計回りの回転を完了し、E字型コア4'の左立部材4a'頂端に傾斜当接しているものとする。

【0029】この時、永久磁石7が発生する磁界は、図中実線矢印で示す永久磁石7-シーソーアーマチュア8'-左立部材4a'-永久磁石7を経由する磁気閉回路の磁界が、透磁率の低い空気中を通過する永久磁石7-シーソーアーマチュア8'-右立部材4c'-永久磁石7を経由する磁界と比較して非常に多い為、当該シーソーアーマチュア8'はE字型コア4'の左側部材4a'への当接状態が保持され、導電性の金属板バネ等からなる導電ライン板10'の可動接点10a'先端はシーソーアーマチュア8'の抑圧が存在しないので当該可動接点10a'自身の弾性復元力により柱状固定接点12'頂端とは離れており、接点は断路状態に保たれている。

【0030】次に図3(b)に示すように円筒コイル5a、5bに通電する。E字型コア4'の左立部材4a'及び右立部材4c'にそれぞれ巻着された円筒コイル5a、5bに図中に示すような向きに電流を通電すると、

磁界は図中破線矢印で示すように発生する。この結果、E字型コア4'の左立部材4a'では当該磁界は永久磁石7の定常磁界と反対方向であるため打ち消し合って弱まり、右立部材4c'では当該磁界は永久磁石7の定常磁界と同一方向であるため強め合う。

【0031】よって、図示しない支軸軸を中心としてシーソーアーマチュア8'は図中時計回りに回転し、E字型コア4'の右立部材4c'に傾斜当接する。この時は、永久磁石7が発生する磁界は図中矢印で示す様に、ロスが少ない永久磁石7-シーソーアーマチュア8'-右立部材4c'-永久磁石7を経由する磁気閉回路を通過する磁界が、永久磁石7-シーソーアーマチュア8'-左立部材4a'-永久磁石7を経由する磁界よりも非常に多くなり、当該シーソーアーマチュア8'はE字型コア4'の右立部材4c'に当接状態が保持され、なおかつシーソーアーマチュア8'延長端8a'が可動接点10a'を押下して柱状固定接点12と先端を接触し、図3(c)に示すように接点は接路状態となる。

【0032】次に図3(d)に示すように先程の図3(b)とは逆向きに円筒コイル5'に通電すると、前記図3(b)の場合とは逆方向の回転力がシーソーアーマチュア8'に作用するので、シーソーアーマチュア8'は反時計回りに回転し、前記図3(a)の状態に再度復帰し接点は再度断路状態に自己保持される。

【0033】以上の一連の手順で示した様に、本実施例に採用した電磁リレー2a群は接点の自己保持機能を発現するので、接点の切り換え動作時のみ円筒コイル5a、5bに極性を制御して通電すれば良いので、接点閉路時における励磁電流の常時通電は不要となる。

【0034】また本実施例では、構成部品点数の削減を目的として複数の可動接点10a'を分岐突出する導電ライン板10'を一体切り出し形成してあり、紙面横方向の一系列の接点全てに互り共用可能である。この理由として、自己保持型マトリクススイッチβでは縦横のケーブルを常にそれぞれ一対一に接続するため、同一列上の接点を共用しても接続動作に不都合は生じないからである。本実施例はこのような構成を有するので、接点に自己保持機能を持たせつつ切り換え操作が実施できる。

【0035】(実施例2)本発明の第2実施例につき図面を用いて詳説する。図5は本実施例を示す自己保持型マトリクススイッチの拡大一部縦断正面図、図6(a)(b)は同・接点のそれぞれの断接動作原理段階説明図である。図中、2bは本実施例における電磁リレー、5'は円筒コイルである。尚、前記第1実施例と同一部材には同一記号を付してある。

【0036】図5乃至図6に示す本実施例における自己保持型電磁リレー2bを、前記第1実施例の自己保持型マトリクススイッチβにおける電磁リレー2aとその構造につき比較すると、円筒コイル5'はE字型コア4'の左立部材4a'のみに巻着されており、右立部材4

c'には捲着されていない点のみが相違する。

【0037】本実施例はこのような具体的実施態様を呈し、その具体的な動作手順を以下に説明する。尚、説明の反復を避けるため、ここでは前記第1実施例との相違点のみを述べる。最初にシーソーアーマチュア8'は左側に傾倒して図示しない接点は断路状態にあるものとする。

【0038】ここで図6(a)に示す向きに円筒コイル5'に電流を通電すると、図中破線で示す様な磁力線が発生する。これに対し定常状態にある永久磁石の磁力線は図中実線で表される。よって、E字型コア4'の左立部材4a'を通過する磁力線は反対方向で互いに打ち消し合い、右側部材4c'を通過する磁力線は同一方向で強め合う。

【0039】この結果、シーソーアーマチュア8'は時計回りに回転して右立部材4c'に当接するので、図示しない可動接点10a'先端は押下されて柱状固定接点12'頂端に当接し、接点は前記第1実施例と同様に接路状態に自己保持される。

【0040】接点を断路状態に復帰させる場合には、前記第1実施例と同様に逆極性の励磁電流をコイル端子6を介して円筒コイル5'に通電することにより、図6

(b)に示すように円筒コイル5'による前記図6

(a)と逆方向の磁界が発生し、前記第1実施例と同様に接点は断路状態に復帰する。

【0041】本実施例の動作原理はこのような構成を有するので、前記第1実施例と同様に接点の自己保持機能を発揮しつつ接点の断接動作を行う事が出来る。

【0042】(実施例3)本発明の第3実施例につき図面を用いて詳説する。図7は本実施例を示す自己保持型マトリクススイッチの平面図、図8は同・正面図である。図中、β'は本実施例の自己保持型マトリクススイッチ、2cは電磁リレー、5a"、5b"は平面渦巻状プリントパターンコイル、17はプリント基板、18、19、20は貫設孔である。尚、前記第1乃至第2実施例と同一部材には同一記号を付してある。

【0043】図8において、本実施例の自己保持型マトリクススイッチβ'は、前記第1乃至第2実施例に示した円筒コイル5a、5b、5'に代わり、複数のプリントパターンコイル5a"、5b"を導電性の金属薄膜等をパターンエッチング等の方法を用いて表面上に一括描着形成したプリント基板17を実装基板1上方に互り並行に所定間隔をおいて左右対立する支柱16群中間に貫着して架設されている。

【0044】当該プリント基板17には、各E字型コア4'の左立・中立・右立部材4a'~4c'がそれぞれ挿嵌されるように3つの貫設孔18が1組となつて対応し貫設されている。

【0045】本実施例はこのような構成を有するので、前記第1乃至第2実施例と同様に自己保持性を発揮し

つ接点の切り換え操作が可能である。

【0046】これら第1乃至第3実施例においては、(入力回線数2回線)×(出力回線数2回線)に対応させて、電磁リレー2a、2b、2cを(縦方向2個)×(横方向2個)とした場合を例示して説明したが、収容する入出力回線数に応じて縦方向及び横方向の電磁リレー2a、2b、2cの個数をそれぞれ任意に選択しても勿論構わない。

【0047】

【発明の効果】かくして本発明の自己保持型マトリクススイッチを採用することにより、従来の自己保持型マトリクススイッチと比較して構成部品点数を削減することができ、イニシャルコストの低減を図り、経済性を有する。

【0048】また、自己保持型マトリクススイッチの組立に際して、従来のような電磁リレーの組立作業と実装基板上への当該電磁リレーの実装作業からなる二段階の煩雑な組立工程を不要とし、即、実装基板上に構成可能であつて、組立作業を大幅に簡略化する。

【0049】さらに、各構成部材を真上一方向より実装基板上に挿着するのみで構成可能であるので、特に自動組立装置を採用して組立作業を実施する場合には、構成部品を実装基板表面側の真上一方向から取り付け可能であつて、組立装置に特殊な構成が不要となり、なおかつ組立作業のスピードアップをも実現する。

【0050】またコイルをプリント基板上にプリントパターンとして同時に複数個描設形成したので、従来では単独の電磁リレーを(入力回線数)×(出力回線数)の個数だけ必要とし、さらに当該電磁リレーのコイル作製に当たっては煩雑なコイルの巻き付け作業が不可欠であつたのを何れも不要としたので、コイル数の増加に伴う製造コストの上昇は非常に僅かであり、なおかつコイル巻き付け作業を不要とし、製造工程の削減及びイニシャルコストの大幅な低減をも併せて実現する。

【0051】さらに軸受に一体装置の袋溝型軸受を採用した事により、長期に亙り不具合なく安定撻動し、しかも部品点数を減少して簡素に構成可能である。

【0052】導電ライン板を縦方向或いは横方向一列に互り共用したことにより、導電ライン数の飛躍的な増加を抑制し、部品点数を削減して構成可能とする。

【図面の簡単な説明】

【図1】本発明の第1実施例を示す自己保持型マトリクススイッチの平面図である。

【図2】同上・正面図である。

【図3】(a)(b)(c)(d)は、同上・接点の断接動作原理の各段階説明図である。

【図4】同上・接点の袋溝型軸受の拡大一部断面図である。

【図5】本発明の第2実施例の自己保持型マトリクススイッチに採用する電磁リレーの拡大一部縦断面図であ

る。

【図6】(a)(b)は、同上・接点の断接動作原理の各段階説明図である。

【図7】本発明の第3実施例を示す自己保持型マトリクススイッチの平面図である。

【図8】同上・正面図である。

【図9】従来例の自己保持型マトリクススイッチの平面図である。

【図10】同上・拡大一部縦断正面図である。

【符号の説明】

α , β , β' …自己保持型マトリクススイッチ

1 …実装基板

2, 2a, 2b, 2c …電磁リレー

3 …ケース

4, 4' …E字型コア

4a …上側部材

4a' …左立部材

4b …中央部材

4b' …中立部材

4c …下側部材

4c' …右立部材

* 5 …コイル

5a, 5b, 5' …円筒コイル

5a'', 5b'' …プリントパターンコイル

6 …コイル端子

7 …永久磁石

8' …シーソーアーマチュア

8a, 8b …アーマチュア

8a' …延長端

9a, 9b …板状支持パネ

10 10' …導電ライン板

10, 10a' …可動接点

11 …可動接点端子

12 …固定接点

12' …柱状固定接点

13 …固定接点端子

14 …軸受

14a, 14b …挟持パネ

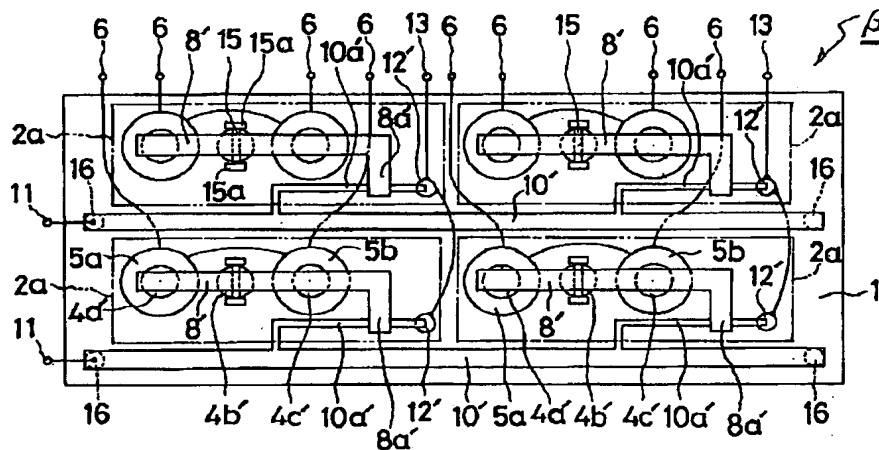
15 …支軸軸

16 …支柱

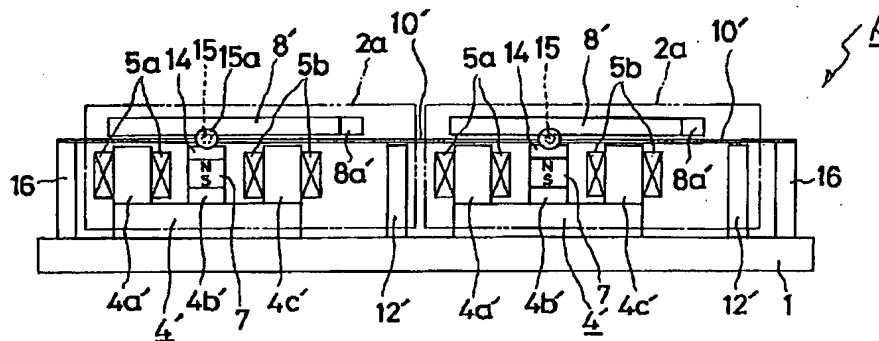
20 17 …プリント基板

* 18, 19, 20 …貫設孔

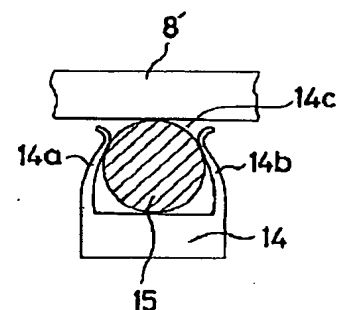
【図1】



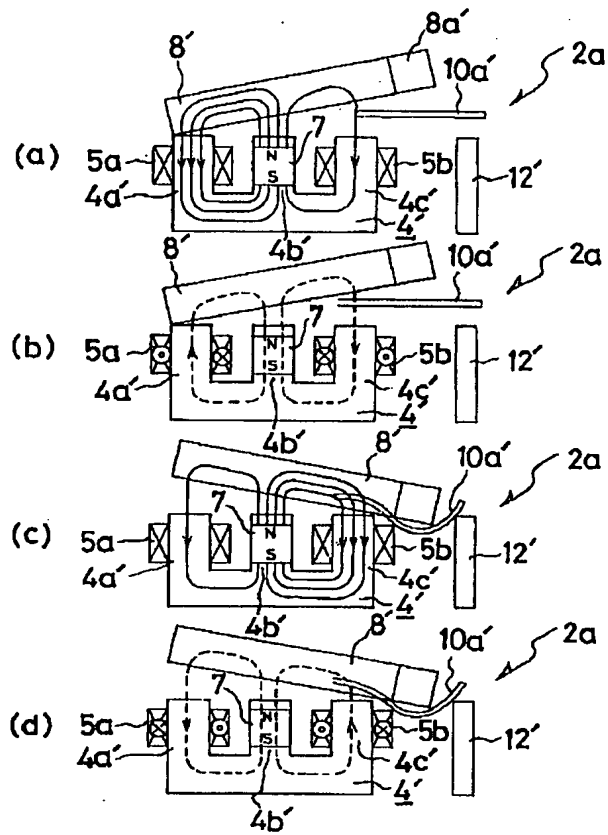
【図2】



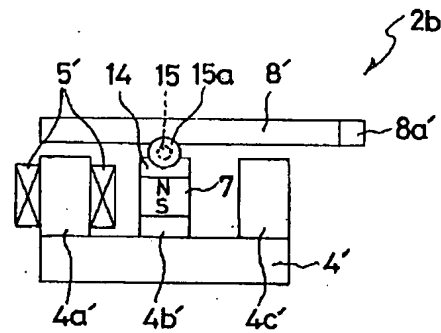
【図4】



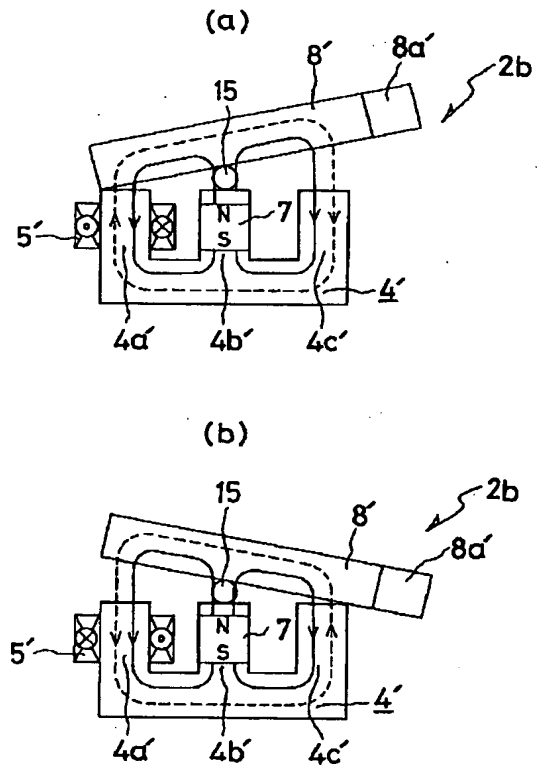
【図3】



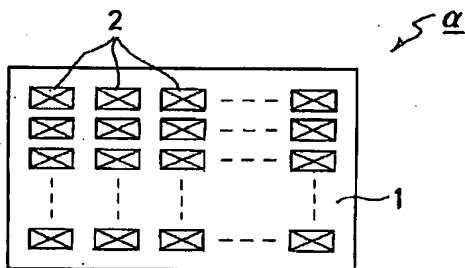
【図5】



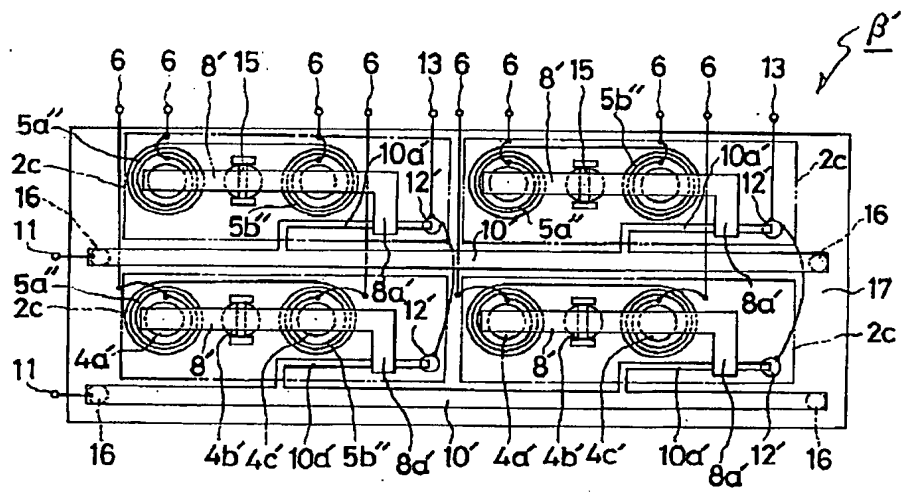
【図6】



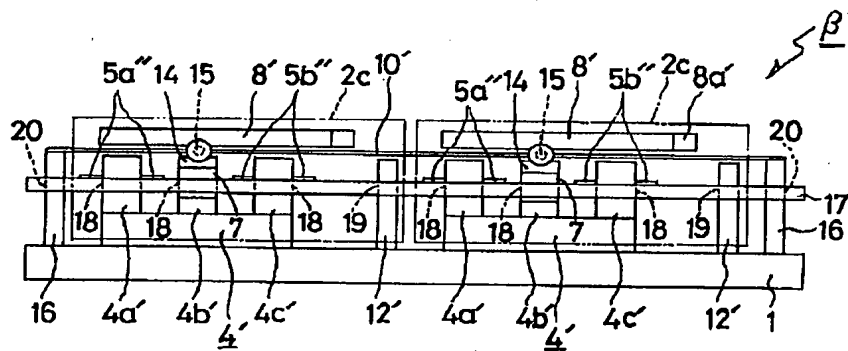
【図9】



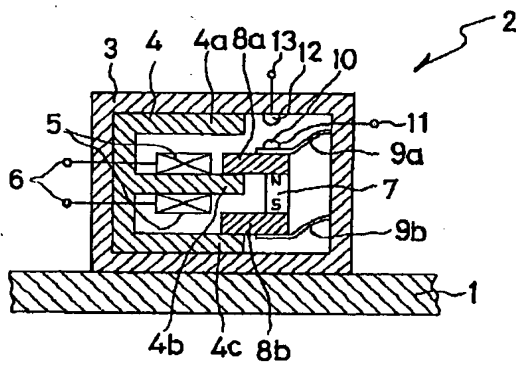
【図 7】



【図 8】



【図 10】



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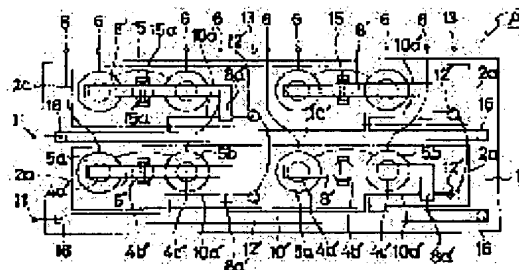
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KUWANO HIROKI

(54) SELF-MAINTENANCE TYPE MATRIX SWITCH

(57)Abstract:

PURPOSE: To make assembly work easy by pushing a L-shaped movable contact point, which is a part forking and projected out of a conductive line plate in the middle, down at the extended end of an armature and making the tip part of the movable contact point freely have a contact with or part from the tip end of a fixed contact point.

CONSTITUTION: A permanent magnet oriented in magnetic pole direction and a bearing are successively laid and fixed in the lower upper end of a neutral part 4b'. The fulcrum of a seesaw armature 8' is supported at its lower point and fixed in supporting rotary axis 15 in the way it can seesaw freely, wherein the rotary axis 15 is supported in the bearing in the way it can rotate freely. An extended end 8a' bent rectangularly is formed in the right end of the armature 8' and both ends are supported by supporting columns 16 on the opposite to each other. An L-shaped movable contact point 10a', which is a part forking and projected out of a conductive line plate 10' arranged in the upper side of a mounting substrate 1 in transverse direction in parallel to the transverse line of the substrate 1 at a prescribed neighboring gap, is pushed down by the extended end 8a'. As a result, the tip of the L-shaped movable contact point 10a' can be brought into contact freely with the tip of the column-like fixed contact point 12'.



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CLAIMS

[Claim(s)]

[Claim 1] A mounting substrate and the easy mold core by which arranged the sense in this direction on the mounting substrate concerned, and the in-every-direction array was carried out and supine lying down was carried out at the shape of plane grating, The permanent magnet by which savings fixing was carried out at the tip of a neutral member of said easy mold core, and the coil which ****(ed) in three dimensions or superficially both said easy mold both [one side or] of a right-and-left coexistence member, The apex of said permanent magnet supports the supporting point free [****]. Both ends to the right-and-left coexistence member of said easy mold core The seesaw armature which can contact freely, respectively, The self-hold mold matrix switch characterized by being pushed by the pillar-shaped stationary contact set up on said mounting substrate, and the extended edge of said seesaw armature one end, and having said pillar-shaped stationary contact and the traveling contact which can be contacted.

[Claim 2] A coil is a self-hold mold matrix switch according to claim 1 characterized by **-arrival-forming in coincidence two or more print patterns which ****(ed) both all easy mold both [one side or] of each right-and-left coexistence member that ****(ed) on the same construction printed circuit board in the shape of a flat-surface swirl.

[Claim 3] The apex of a permanent magnet is a self-hold mold matrix switch according to claim 1 or 2 characterized by putting on the cross-section bag ditch type bearing which has ***** while holding ***** which supports the seesaw armature supporting point inside, after forming free [elastic expanding and contracting] with the pinching spring which forms a concurrency coalition.

[Claim 4] A traveling contact is a self-hold mold matrix switch according to claim 1, 2, or 3 which carries out a branching protrusion from the electric conduction Rhine plate middle by which has flexibility, covered the lengthwise direction, or the longitudinal direction any 1 train, covered the mounting substrate upper part, set contiguity predetermined spacing, and the rack was carried out a total, and is characterized by making it come free [contact] to attend a tip right above [of the pillar-shaped stationary contact which each corresponds].

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the self-hold mold matrix switch with which combining two or more subscriber side circuits and exchange side circuits mutually at arbitration, and connecting alternatively is presented in exchange plants, such as MDF.

[0002]

[Description of the Prior Art] In exchange plants, such as MDF, in order to make the input cable of arbitration, and the output cable of arbitration correspond to one to one and to carry out a line connection electrically, the matrix switch which comes to gather in the electromagnetic relay of a large number to which each contact was connected is used for the intersection of the input cable concerned arranged in the shape of plane grating, and an output cable.

[0003] In the matrix switch concerned, the self-hold mold matrix switch which gave the self-hold function of a contact to the electromagnetic-relay group concerned for the purpose of reducing the consumed electric current is adopted, without always energizing the exciting current of the electromagnetic-relay group which carries out the set configuration of the matrix switch itself.

[0004] It is because the power consumption of the matrix switch itself by which energize a current in a coil momentarily only at the time of **** actuation of a contact, it makes a contact condition change, does not have the need of energizing an exciting current in a steady state, and is constituted from an electromagnetic relay which held the circuit with a switching frequency comparatively small as this reason like the telephone line in the contact by gathering in many electromagnetic relays can be reduced remarkably.

[0005] Such a conventional self-hold mold matrix switch is explained using a drawing. Drawing 9 is the approximate account top view of the self-hold mold matrix switch of the conventional example, and drawing 10 is ** and expansion part drawing of longitudinal section.

[0006] the inside of drawing, and alpha -- the self-hold mold matrix switch of the conventional example, and 1 -- a mounting substrate and 2 -- an electromagnetic relay and 3 -- a case and 4 -- an easy mold core and 5 -- a coil and 6 -- an end-winding child and 7 -- for a tabular support spring and 10, as for a traveling contact terminal and 12, a traveling contact and 11 are [a permanent magnet, and 8a and 8b / an armature, and 9a and 9b / a stationary contact and 13] stationary-contact terminals.

[0007] On the mounting substrate 1, the self-hold mold matrix switch alpha arranges two or more simple substance electromagnetic relays 2 the shape of a grid in the direction of a flat surface, and the mounting configuration is carried out. Each simple substance electromagnetic relay 2 concerned is constituted in the case 3, the coil 5 is coiled around central member 4b of the erection easy mold core 4 which carried out close inner fitting of the third page of the continuation of bottom member 4c to the tooth-back and top member 4a list to the case 3 interior concerned, and the end-winding child 6 to whom an exciting current is supplied is pulled out from the coil 5 concerned in said case 3 exterior.

[0008] The armatures 8a and 8b which furthermore come to form said easy mold core 4 tip and closed magnetic circuit at said easy mold core 4 tip in between free [concurrency migration] on both sides of a permanent magnet 7, The tabular support springs 9a and 9b which come to support the armatures 8a and 8b concerned in said case 3 free [rocking], The traveling contact 10 attached in armature 8a through the tabular support spring 9a concerned, The traveling contact terminal 11 which is connected to the traveling contact 10 concerned and said case 3 exterior comes to pull out, It connects with said traveling contact 10, the stationary contact 12 attached in said case 3 interior free [contact], and the stationary contact 12 concerned, and

consists of stationary-contact terminals 13 which said case 3 exterior comes to pull out.
[0009] The conventional self-hold mold matrix switch alpha has such a configuration. Each [carry out the set configuration of the self-hold mold matrix switch alpha concerned] electromagnetic relay 2 of every By energizing momentarily the exciting current by which the polarity was controlled, carrying out self-hold actuation from the exterior, only at the time of transition of a contact condition, and controlling independently **** actuation of the contact in which the input cable and the output cable were held The line connection of the input cable and output cables of arbitration is mutually carried out to the shape of a matrix in the combination of arbitration.

[0010]

[Problem(s) to be Solved by the Invention] however, the component part mark of each electromagnetic relay 2 in which said conventional self-hold mold matrix switch alpha has three-dimensional machine structure in the manufacture -- comparatively -- increasing -- in addition -- and (input number of circuit) since the manufacturing cost became very high conjointly also as for the electromagnetic relay 2 of the number of x (output number of circuit) being needed, the simplification of structure was demanded.

[0011] Moreover, in manufacture of the self-hold mold matrix switch alpha, 2 of a mounting process processes of subsequently to the shape of a grid mounting the electromagnetic relay 2 of the a large number concerned on the mounting substrate 1 are indispensable to the production process list of many electromagnetic relays 2, the production process increased, and the rise of a manufacturing cost was not avoided.

[0012] Although how to attach the component part of electromagnetic-relay 2 group directly, and constitute it on the mounting substrate 1 as the another configuration approach for this was also considered, there was no change in the solid configuration of the electromagnetic-relay 2 group being carried out in three dimensions on the mounting substrate 1 also in this case, complication of the configuration of assembly equipment could not be avoided and the rise of an initial cost became unavoidable similarly. In here, this invention uses as an offer plug the self-hold mold matrix switch which realizes simplification of structure and a making process, and cheap-ization of production cost in view of the conventional fault concerned.

[0013]

[Means for Solving the Problem] Solution of said technical problem is attained when this invention adopts a new characteristic configuration means to enumerate next. The easy mold core which the 1st description of this invention arranged the sense in this direction on the mounting substrate and the mounting substrate concerned, and the in-every-direction array was carried out at the shape of plane grating, and carried out supine lying down, The permanent magnet by which savings fixing was carried out at the tip of a neutral member of said easy mold core, and the coil which ****(ed) in three dimensions or superficially both said easy mold both [one side or] of a right-and-left coexistence member. The apex of said permanent magnet supports the supporting point free [****]. Both ends to the right-and-left coexistence member of said easy mold core The seesaw armature which can contact freely, respectively, It is the self-hold mold matrix switch which is pushed by the pillar-shaped stationary contact set up on said mounting substrate, and the extended edge of said seesaw armature one end, and comes to have said pillar-shaped stationary contact and the traveling contact which can be contacted.

[0014] Two or more 2nd description of this invention is a self-hold mold matrix switch which it comes to form ** arrival at coincidence about the print pattern with which the coil in said 1st description ****(ed) both all easy mold both [one side or] of each right-and-left coexistence member that ****(ed) on the same construction printed circuit board in the shape of a flat-surface swirl.

[0015] The 3rd description of this invention is a self-hold mold matrix switch which comes to put on the cross-section bag ditch type bearing which has ***** while the apex of the permanent magnet in said 1st or 2nd description held the rocking lever shaft which supports the seesaw armature supporting point inside, after forming free [elastic expanding and contracting] with the pinching spring which forms a concurrency coalition.

[0016] The 4th description of this invention is a self-hold mold matrix switch which the traveling

contact in said 1st, 2nd, or 3rd description carries out a branching protrusion from the electric conduction Rhine plate middle by which has flexibility, covered the lengthwise direction, or the longitudinal direction any 1 train, covered the mounting substrate upper part, set contiguity predetermined spacing, and the rack was carried out a total, and is made to come to attend a tip right above [of the pillar-shaped stationary contact which each corresponds] free [contact].

[0017]

[Function] since this invention provided the above means -- the component part mark of a self-hold mold matrix switch -- reducing -- in addition -- and the attachment activity from a mounting substrate side was easy-ized, and the automatic manufacture of it was attained.

[0018]

[Example]

(Example 1) The 1st example of this invention is explained in full detail per drawing. Each phase explanatory view of the **** principle of operation of ** and a contact and drawing 4 of the top view of the self-hold mold matrix switch which drawing 1 shows the 1st example of this invention, the front view showing the example of others [drawing 2], drawing 3 (a), (b), (c), and (d) are the expansion part sectional views of bag ditch type bearing.

[0019] The self-hold mold matrix switch of this example and 2a among drawing beta An electromagnetic relay, In 4a', left **** material and 4b' right Tatebe material and 8' for a neutral member and 4c' A seesaw armature, 8a' -- a right-angle extension edge and 10' -- for a pillar-shaped stationary contact and 14, bearing, and 14a and 14b of a concurrency alliance pinching spring and 15 are [an electric conduction Rhine plate and 10a' / an L form traveling contact and 12' / ***** with both-ends stopper flange 15a and 16] stanchions. In addition, the same notation was given to the same member as said conventional example.

[0020] In drawing 1, the matrix switch beta of this example shows the case where a total of four electromagnetic-relays 2a of x (two longitudinal directions) with the simplest (two lengthwise directions) configuration corresponding to x (input number-of-circuit 2 circuit) (output number-of-circuit 2 circuit) is used. Two or more electromagnetic-relay 2a carries out the plane-grating-like in-every-direction array of the matrix switch beta of this example, and it comes to mount it on the mounting substrate 1.

[0021] Cylindrical-coil 5a is coiled around left **** material 4a[of easy mold core 4' which the electromagnetic-relay 2a concerned arranged the sense with sideways / same / on said mounting substrate 1, and carried out supine lying-down immobilization]', cylindrical-coil 5b is coiled around right Tatebe material 4c', respectively, series connection of cylindrical-coil 5a and the cylindrical-coil 5b is mutually carried out to reversed polarity, and two poles are connected to the coil electrode 6.

[0022] Lower carrier fixing is carried out and the supporting point of seesaw armature 8' is constituted free [****] by ***** 15 sequential savings fixing of the permanent magnet 7 and bearing 14 to which it pointed in the direction of a magnetic pole is carried out at the low upper limit of neutral member 4b', and bearing of the rotation of was made free into the bearing 14 concerned.

[0023] Extended edge 8a' by which the right end of the seesaw armature 8' concerned was bent by the right angle is formed. L form traveling contact 10a' which carried out the branching protrusion from the middle of electric conduction Rhine plate 10' by which bearing was carried out in both ends with the stanchion 16 which confronts each other, covered the longitudinal direction of the mounting substrate 1 upper part, set contiguity predetermined spacing, and the rack was carried out a concurrency total is pushed by said extended edge 8a'. The tip of L form traveling contact 10a' is constituted free [a pillar-shaped stationary-contact 12' apex and contact].

[0024] Moreover, the configuration member of this example consists of wearing from the right above one direction of the 1st page of a mounting substrate possible [assembly]. An example of the assembly procedure concerned is given and explained below. Array fixing of easy mold core 4' and pillar-shaped stationary-contact 12', and the two stanchions 16 is carried out first in the predetermined location on the 1st page of a mounting substrate, respectively.

[0025] Next, while fitting in the cylindrical coils 5a and 5b coiled around the coil bobbin which is

not beforehand illustrated to left **** material 4a[of easy mold core 4'] ', and right Tatebe material 4c', respectively, savings fixing of the permanent magnet 7 is carried out in the direction of a magnetic pole at neutral member 4b' upper limit, and bearing 14 is further put on the apex of the permanent magnet 7 concerned.

[0026] Subsequently, the above procedure which supports ***** 15 by which carried out **** fixing of electric conduction Rhine plate 10' for the upper limit of two stanchions 16, and used means, such as adhesion, in advance and rectangular fixing was carried out at the seesaw armature 8' supporting-point bottom in bearing 14 is completed, and it is assembled.

[0027] Although seesaw armature 8' is supported pivotably by bearing 14 through ***** 15 here, since the adsorption power of a permanent magnet 7 acts and adsorption maintenance is always carried out, laying in bearing 14 is only available for seesaw armature 8'. What is necessary is to form bearing 14 in a bag ditch type configuration as shown in drawing 4 as an example, to form top ***** 14c in which elastic expanding and contracting are free with the pinching springs 14a and 14b which form a concurrency coalition, and just to pinch ***** 15 free [rotation] inside, in order to make support into a positive thing furthermore. To the fixing approach mentioned here, it is selectable in the approach of arbitration, such as a screw stop and adhesion.

[0028] This example presents such a concrete embodiment and explains it per the actuation below. First, as the disconnection condition of a contact is shown in drawing 3 (a), seesaw armature 8' shall complete rotation of the counterclockwise rotation centering on ***** 15, and shall have carried out inclination contact beforehand at the left **** material 4a' apex of easy mold core 4'.

[0029] the permanent magnet 7--seesaw in which the field which a permanent magnet 7 generates is shown by the drawing solid line arrow head at this time -- the field of the magnetic closed circuit which goes via the armature 8'--left **** material 4a'--permanent magnet 7 It compares with the field which goes via the armature 8'--right Tatebe material 4c'--permanent magnet 7. the permanent magnet 7--seesaw which passes through the inside of air with low permeability, since many [very] As for the seesaw armature 8' concerned, the contact condition to left-hand side member 4a[of easy mold core 4'] ' is held. Since oppression of seesaw armature 8' does not exist, with the pillar-shaped stationary-contact 12' apex, it is separated from the traveling contact 10a' tip of electric conduction Rhine plate 10' which consists of a conductive metal flat spring etc. with elastic stability of traveling contact 10a' own [concerned], and the contact is maintained at the disconnection condition.

[0030] Next, as shown in drawing 3 (b), it energizes to cylindrical coils 5a and 5b. If a current is energized to the sense as shown in the cylindrical coils 5a and 5b coiled around left **** material 4a[of easy mold core 4'] ', and right Tatebe material 4c', respectively all over drawing, a field will be generated as a drawing destructive line arrow head shows. Consequently, at left **** material 4a[of easy mold core 4'] ', since the field concerned is the stationary field and opposite direction of a permanent magnet 7, it is negated mutually and becomes weaker, and by right Tatebe material 4c', since the field concerned is the same direction as the stationary field of a permanent magnet 7, it suits in slight strength.

[0031] Therefore, a core [***** which is not illustrated], seesaw armature 8' carries out lever rotation at the clockwise rotation in drawing, and carries out inclination contact at right Tatebe material 4c[of easy mold core 4'] '. at this time, the drawing Nakaya mark shows the field which a permanent magnet 7 generates -- as -- permanent magnet 7--seesaw with few losses -- the field which passes through the magnetic closed circuit which goes via the armature 8'--right Tatebe material 4c'--permanent magnet 7 It increases more than the field which goes via the armature 8'--left **** material 4a'--permanent magnet 7 very much. permanent magnet 7--seesaw -- a contact condition holds the seesaw armature 8' concerned to right Tatebe material 4c[of easy mold core 4'] ' -- having -- in addition -- and seesaw armature 8' extension edge 8a' pushes traveling contact 10a', and as it contacts and the pillar-shaped stationary contact 12 and a tip are shown in drawing 3 (c), a contact will be in a **** condition.

[0032] Next, if it energizes to the reverse sense with previous drawing 3 (b) at cylindrical-coil 5' as shown in drawing 3 (d), since the lever turning effort of hard flow will act on seesaw armature

8' with the case of said drawing 3 (b), seesaw armature 8' carries out lever rotation counterclockwise, and it returns to the condition of said drawing 3 (a) again, and changes the self-hold of the contact into a disconnection condition again.

[0033] Since what is necessary is to control a polarity to cylindrical coils 5a and 5b only at the time of switch actuation of a contact, and to energize it to them, since the electromagnetic-relay 2a group which was shown in a series of above procedures and which was adopted as this example like discovers the self-hold function of a contact, regular energization of the exciting current at the time of contact-making becomes unnecessary.

[0034] Moreover, in this example, electric conduction Rhine plate 10' which carries out the branching protrusion of two or more traveling contact 10a' for the purpose of reduction of component part mark is really started, and it has formed, and can use in common [all the contacts of the single tier of a space longitudinal direction]. It is because it does not produce un-arranging in connection actuation with the self-hold mold matrix switch beta as this reason even if it shares the contact on the same train in order to always connect a cable in every direction to one to one, respectively. Since this example has such a configuration, switch actuation can be carried out giving a self-hold function to a contact.

[0035] (Example 2) It explains in full detail using a drawing per 2nd example of this invention. The expansion part vertical section front view of the self-hold mold matrix switch which drawing 5 shows this example, drawing 6 (a), and (b) are each **** principle-of-operation phase explanatory view of ** and a contact. An electromagnetic relay [in / in 2b / this example] and 5' are cylindrical coils among drawing. In addition, the same notation is given to the same member as said 1st example.

[0036] If self-hold mold electromagnetic-relay 2b in this example shown in drawing 5 thru/or drawing 6 is compared with electromagnetic-relay 2a in the self-hold mold matrix switch beta of said 1st example per the structure, cylindrical-coil 5' is coiled only around left **** material 4a [of easy mold core 4'] ', and only the point which is not coiled is different from right Tatebe material 4c'.

[0037] This example presents such a concrete embodiment and explains the concrete operations sequence below. In addition, in order to avoid repeatedly [of explanation], only difference with said 1st example is described here. The contact which seesaw armature 8' concentrates on left-hand side first, and is not illustrated shall be in a disconnection condition.

[0038] If a current is energized to the sense shown in drawing 6 (a) here at cylindrical-coil 5', line of magnetic force as shown by the drawing destructive line will be generated. On the other hand, the line of magnetic force of the permanent magnet in a steady state is expressed with a drawing solid line. Therefore, it negates each other's line of magnetic force which passes left **** material 4a [of easy mold core 4'] ' in an opposite direction, and the line of magnetic force which passes right-hand side member 4c' suits in slight strength in the same direction.

[0039] Consequently, since seesaw armature 8' rotates clockwise and contacts right Tatebe material 4c', the traveling contact 10a' tip which is not illustrated is pushed, and contacts a pillar-shaped stationary-contact 12' apex, and it changes the self-hold of the contact into a **** condition like said 1st example.

[0040] In returning a contact to a disconnection condition, by energizing the exciting current of reversed polarity as well as said 1st example to cylindrical-coil 5' through the end-winding child 6, as shown in drawing 6 (b), the field of said drawing 6 (a) by cylindrical-coil 5' and hard flow occurs, and a contact returns to a disconnection condition like said 1st example.

[0041] Since the principle of operation of this example has such a configuration, **** actuation of a contact can be performed demonstrating the self-hold function of a contact like said 1st example.

[0042] (Example 3) It explains in full detail using a drawing per 3rd example of this invention. The top view of the self-hold mold matrix switch which drawing 7 shows this example, and drawing 8 are ** and a front view. For the self-hold mold matrix switch of this example, and 2c, a printed circuit board, and 18, 19 and 20 are [beta' / an electromagnetic relay, 5a'', and 5b'' of a flat-surface spiral print pattern coil and 17] installation holes among drawing. In addition, the same notation is given to the same member as said the 1st thru/or 2nd example.

[0043] In drawing 8 self-hold mold matrix switch beta' of this example To the cylindrical coils 5a and 5b shown in said the 1st thru/or 2nd example, and 5', instead of, The mounting substrate 1 upper part is covered in print pattern coil 5a'' which is plurality, and the printed circuit board 17 which *****-arrival-formed 5b'' for the conductive metal thin film etc. on the front face using approaches, such as pattern etching, and it carries out ** arrival and is constructed in the stanchion 16 group middle which sets predetermined spacing in parallel and carries out right-and-left confrontation.

[0044] It becomes 1 set, and three installation holes 18 correspond and are installed by the printed circuit board 17 concerned so that ****, neutrality and right Tatebe material 4a[of E character each mold core 4'] ' - 4c' may be fitted in, respectively.

[0045] Since it has such a configuration, switch actuation of a contact is possible for it, this example demonstrating self-hold nature like said the 1st thru/or 2nd example.

[0046] Although the case where made it correspond to x (input number-of-circuit 2 circuit) (output number-of-circuit 2 circuit), and electromagnetic-relay 2a, 2b, and 2c were made into x (two lengthwise directions) (two longitudinal directions) in these [1st] thru/or the 3rd example was illustrated and explained Of course, it does not matter even if it chooses the number of electromagnetic-relay 2a of a lengthwise direction and a longitudinal direction, 2b, and 2c as arbitration according to the I/O number of circuit to hold, respectively.

[0047]

[Effect of the Invention] By adopting the self-hold mold matrix switch of this invention in this way, component part mark can be reduced as compared with the conventional self-hold mold matrix switch, reduction of an initial cost is aimed at, and it has economical efficiency.

[0048] Moreover, on the occasion of the assembly of a self-hold mold matrix switch, it is made unnecessary like two steps of complicated erectors who consist of assembly operation of an electromagnetic relay like before, and a mounting activity of the electromagnetic relay concerned to a mounting substrate top, and on ** and a mounting substrate, a configuration is possible and assembly operation is simplified sharply.

[0049] furthermore -- since it can constitute only from inserting each configuration member on a mounting substrate from a right above one direction, when adopting especially automatic-assembling equipment and carrying out assembly operation, a right above [a mounting substrate front-face side] one direction to installation of a component part is possible, and a configuration special to assembly equipment is unnecessary -- becoming -- in addition -- and speedup of assembly operation is also realized.

[0050] Moreover, since **** formation of two or more coils was carried out as a print pattern on the printed circuit board at coincidence Since only the number of x (input number of circuit) (output number of circuit) needed the electromagnetic relay independent in the former, the complicated coil twisted in coil production of the electromagnetic relay concerned further and it made it unnecessary each for whose activity to have been indispensable the rise of the manufacturing cost accompanying the increment in the number of coils -- very much -- small -- in addition -- and a coiling attachment activity is done unnecessary, and reduction of production processes and sharp reduction of an initial cost are also realized collectively.

[0051] By furthermore having really adopted the bag ditch type bearing of equipment as bearing, it continues at a long period of time, and stabilization **** is carried out without fault, moreover, it can decrease and components mark can be constituted simply.

[0052] By having covered the lengthwise direction or the longitudinal direction single tier, and having shared the electric conduction Rhine plate, the fast increment in the number of electric conduction Rhine is controlled, components mark are reduced, and a configuration is made possible.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the top view of the self-hold mold matrix switch in which the 1st example of this invention is shown.

[Drawing 2] It is - front view same as the above.

[Drawing 3] (a), (b), (c), and (d) are each phase explanatory view of the **** principle of operation of - contact same as the above.

[Drawing 4] It is the expansion part sectional view of the bag ditch type bearing of - contact same as the above.

[Drawing 5] It is expansion part drawing of longitudinal section of the electromagnetic relay adopted as the self-hold mold matrix switch of the 2nd example of this invention.

[Drawing 6] (a) and (b) are each phase explanatory view of the **** principle of operation of - contact same as the above.

[Drawing 7] It is the top view of the self-hold mold matrix switch in which the 3rd example of this invention is shown.

[Drawing 8] It is - front view same as the above.

[Drawing 9] It is the top view of the self-hold mold matrix switch of the conventional example.

[Drawing 10] It is - expansion part vertical section front view same as the above.

[Description of Notations]

alpha, beta, beta' -- Self-hold mold matrix switch

1 -- Mounting substrate

2, 2a, 2b, 2c -- Electromagnetic relay

3 -- Case

4 4' -- Easy mold core

4a -- Top member

4a' -- Left **** material

4b -- Central member

4b' -- Neutral member

4c -- Bottom member

4c' -- Right Tatebe material

5 -- Coil

5a, 5b, 5' -- Cylindrical coil

5a'', 5b'' -- Print pattern coil

6 -- End-winding child

7 -- Permanent magnet

8' -- Seesaw armature

8a, 8b -- Armature

8a' -- Extended edge

9a, 9b -- Tabular support spring

10' -- Electric conduction Rhine plate

10 10a' -- Traveling contact

11 -- Traveling contact terminal

12 -- Stationary contact

12' -- Pillar-shaped stationary contact

- 13 -- Stationary-contact terminal
 14 -- Bearing
 14a, 14b -- Pinching spring
 15 -- *****
 16 -- Stanchion
 17 -- Printed circuit board
 18, 19, 20 -- Installation hole

[Translation done.]

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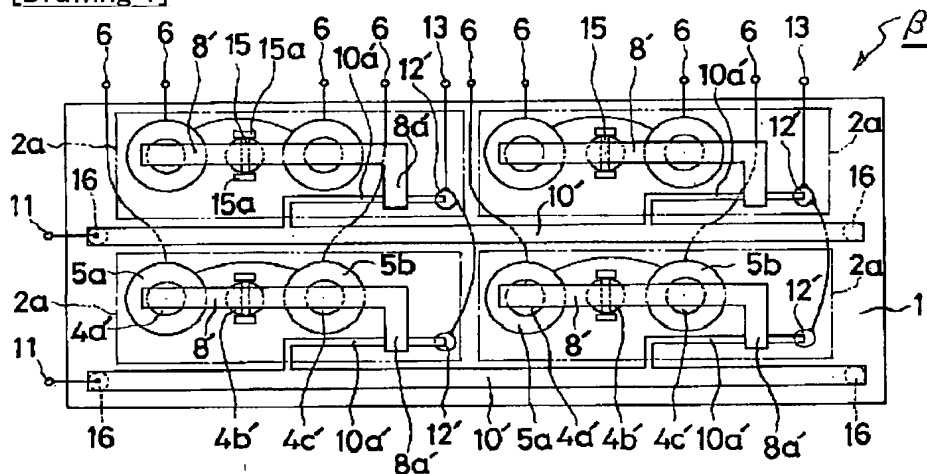
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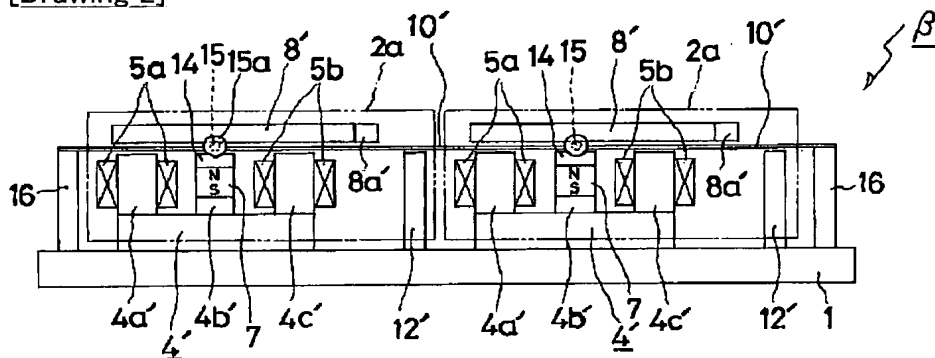
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DRAWINGS

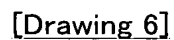
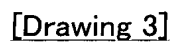
[Drawing 1]

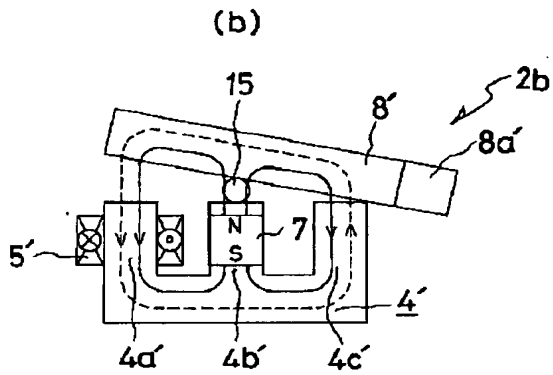
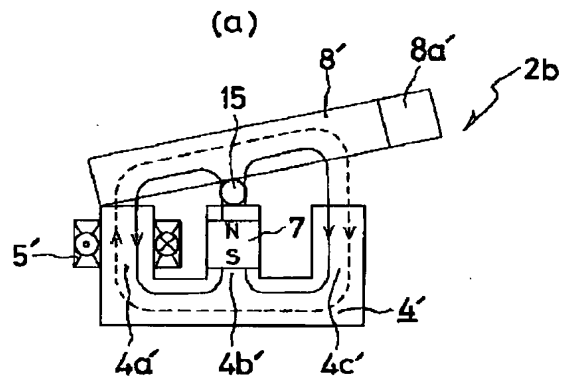


[Drawing 2]

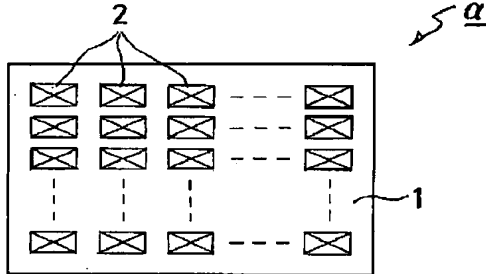


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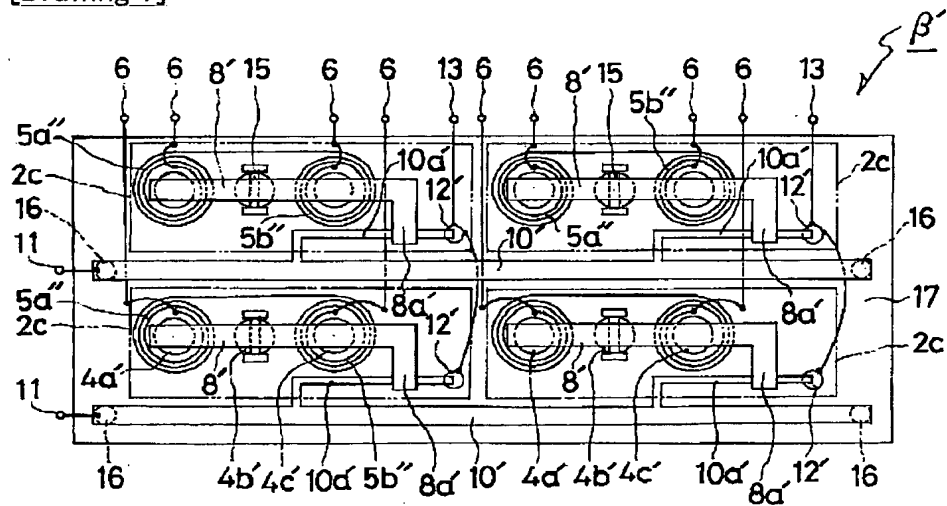




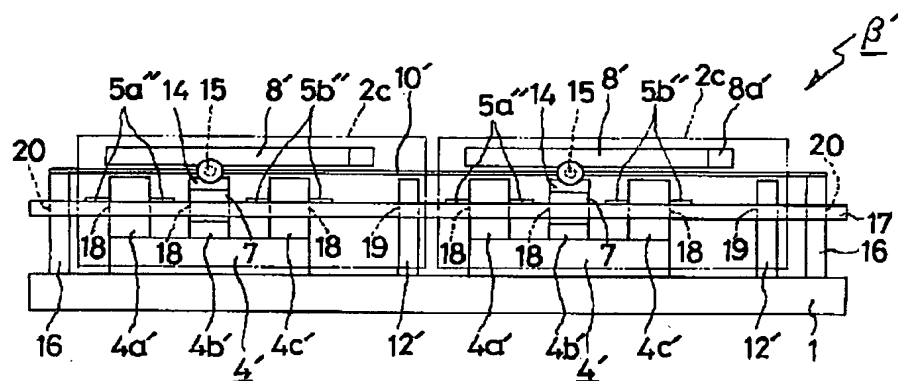
[Drawing 9]



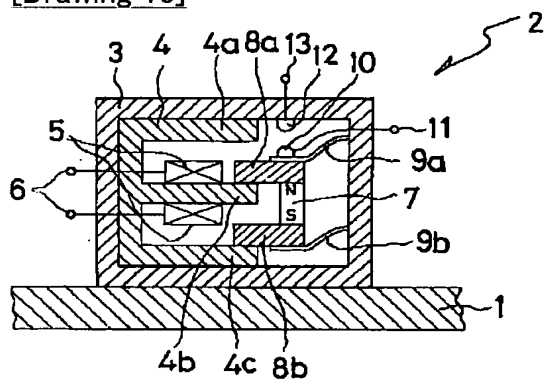
[Drawing 7]



[Drawing 8]



[Drawing 10]



[Translation done.]